

CLAIMS:

1. A method of activating helper T cells said method comprising administering a T cell activating effective amount of GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
 2. The method according to claim 1 wherein said helper T cell is a CD4⁺ T cell.
 3. The method according to claim 2 wherein said CD4⁺ T cell is a CD4⁺ NK1.1⁺ T cell.
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4. The method according to any one of claims 1-3 wherein said complex comprises GPI and malarial CS protein or derivative or equivalent thereof.
 5. The method according to any one of claims 1-3 wherein said complex comprises GPI and MSP-1 or derivative or equivalent thereof.
 6. The method according to any one of claims 1-3 wherein said complex comprises GPI and MSP-2 or derivative or equivalent thereof.
 7. The method according to any one of claims 1-3 wherein said complex comprises GPI and *Leishmanial* PSA-2 or derivative or equivalent thereof.
 8. The method according to any one of claims 1-3 wherein said complex comprises GPI and GP63 or derivative or equivalent thereof.
 9. The method according to any one of claims 1-8 wherein said GPI is a *Plasmodium* GPI.
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10. The method according to claim 9 wherein said *Plasmodium* is *P. falciparum*.

- Sub A2] 11. The method according to any one of claims 1-8 wherein said GPI comprises a structure selected from:

EtN-P-[M α 2]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-M α 2M α 6M α 4G-Y
 M α 2M α 6M α 4G-Y
 EtN-P-M α 2M α 6M-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G-Y
 M α 2[M α 2][G]M α 2M α 6M α 4G-Y
 M α 2[M α 2][X]M α 2M α 6M α 4G-Y
 M α 2[M α 2][EtN-P]M α 6M α 4G-Y
 M α 6M α 4G α 6Ino-Y
 M α 2M α 6M α 4G α 6Ino-Y
 M α 2[M α 2]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][G]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][X]M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M-Y
 EtN-P-[M α 2][X]M α 2M α 6M-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M-Y
 M α 2[M α 2][G]M α 2M α 6M-Y
 M α 2[M α 2][X]M α 2M α 6M-Y
 M α 2[M α 2][EtN-P]M α 6M-Y
 M α 2M α 6M-Y
 M α 6M α 4G-Y
 EtN-P-[M α 2][G]M α 2M-Y
 EtN-P-[M α 2][X]M α 2M-Y

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 EtN-P-[M α 2][EtN-P]M α 2M-Y

or derivatives or equivalents thereof wherein EtN is ethanolamine, P is phosphate, M is mannose, G is non-N-acetylated glucosamine, [G] is any non-N-acetylated hexosamine including glucosamine, or any other nitrous-acid labile substituent, Ino is inositol or inositol-phosphoglycerol, [X] is any other substituent, α represents α -linkages which may be substituted with β -linkages wherever required, numeric values represent positional linkages which may be substituted with any other positional linkages as required, and Y is any lipid or phospholipid.

12. The method according to claim 11 wherein said lipid is diacylglycerol, alkylacylglycerol, monoalkylglycerol, ceramide or sphingolipid.
13. The method according to claim 11 wherein said phospholipid is phosphatidylethanolamine, phosphatidylcholine or phosphatidylserine.
14. A method of activating helper T cells said method comprising administering a T cell activating effective amount of GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells wherein said activated T cells provide B cell help.
15. The method according to claim 14 wherein said helper T cell is a CD4⁺ T cell.
16. The method according to claim 15 wherein said CD4⁺ T cell is a CD4⁺ NK1.1⁺ T cell.
17. A method of activating helper T cells said method comprising administering a T cell activating effective amount of GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells wherein said activated T cells induce or otherwise

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upregulate a TH1 type response.

18. A method of activating helper T cells said method comprising administering a T cell activating effective amount of GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells wherein said activated T cells induce or otherwise upregulate a TH2 type response.
19. The method according to claim 17 or 18 wherein said helper T cell is a CD4⁺ T cell.
20. The method according to claim 19 wherein said CD4⁺ T cell is a CD4⁺, NK1.1⁺ T cell.
21. A method of inducing, in a mammal, an immune response directed to GPI said method comprising administering to said mammal a T cell activating effective amount of GPI or derivative or equivalent thereof which GPI is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
22. The method according to claim 21 wherein said helper T cell is a CD4⁺ cell.
23. The method according to claim 22 wherein said CD4⁺ T cell is a CD4⁺ NK1.1⁺ T cell.
24. The method according to any one of claims 21-23 wherein said GPI is *Plasmodium*.
25. The method according to claim 24 wherein said *Plasmodium* is *P. falciparum*.
26. The method according to any one of claims 21-23 wherein said GPI comprises a structure selected from:

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EtN-P-[M α 2]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-M α 2M α 6M α 4G-Y
 M α 2M α 6M α 4G-Y
 EtN-P-M α 2M α 6M-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G-Y
 M α 2[M α 2][G]M α 2M α 6M α 4G-Y
 M α 2[M α 2][X]M α 2M α 6M α 4G-Y
 M α 2[M α 2][EtN-P]M α 6M α 4G-Y
 M α 6M α 4G α 6Ino-Y
 M α 2M α 6M α 4G α 6Ino-Y
 M α 2[M α 2]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][G]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][X]M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M-Y
 EtN-P-[M α 2][X]M α 2M α 6M-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M-Y
 M α 2[M α 2][G]M α 2M α 6M-Y
 M α 2[M α 2][X]M α 2M α 6M-Y
 M α 2[M α 2][EtN-P]M α 6M-Y
 M α 2M α 6M-Y
 M α 6M α 4G-Y
 EtN-P-[M α 2][G]M α 2M-Y
 EtN-P-[M α 2][X]M α 2M-Y
 EtN-P-[M α 2][EtN-P]M α 2M-Y

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or derivatives or equivalents thereof wherein EtN is ethanolamine, P is phosphate, M is mannose, G is non-N-acetylated glucosamine, [G] is any non-N-acetylated hexosamine including glucosamine, or any other nitrous-acid labile substituent, Ino is inositol or inositol-phosphoglycerol, [X] is any other substituent, α represents α -linkages which may be substituted with β -linkages wherever required, numeric values represent positional linkages which may be substituted with any other positional linkages as required, and Y is any lipid or phospholipid.

27. The method according to claim 26 wherein said lipid is diacylglycerol, alkylacylglycerol, monoalkylglycerol, ceramide or sphingolipid.
28. The method according to claim 26 wherein said phospholipid is phosphatidylethanolamine, phosphatidylcholine or phosphatidylserine.
29. A method of inducing, in a mammal, an immune response directed to an antigen, said method comprising administering to said mammal a helper T cell activating effective amount of GPI or derivative or equivalent thereof complexed to said antigen, which GPI-antigen complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
30. The method according to claim 29 wherein said helper T cell is a CD4⁺ T cell.
31. The method according to claim 30 wherein said CD4⁺ T cell is a CD4⁺ NK1.1⁺ T cell.
32. The method according to any one of claims 29-31 wherein said antigen is malarial CS protein or derivative or equivalent thereof.
33. The method according to any one of claims 29-31 wherein said antigen is MSP-1 or derivative or equivalent thereof.

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34. The method according to any one of claims 29-31 wherein said antigen is MSP-2 or derivative or equivalent thereof.
35. The method according to any one of claims 29-31 wherein said antigen is *Leishmania* PSA-2 or derivative or equivalent thereof.
36. The method according to any one of claims 29-31 wherein said antigen is GP63 or derivative or equivalent thereof.
37. The method according to any one of claims 29-36 wherein said GPI comprises a structure selected from:

EtN-P-[M α 2]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G α 6Ino-Y
 EtN-P-M α 2M α 6M α 4G-Y
 M α 2M α 6M α 4G-Y
 EtN-P-M α 2M α 6M-Y
 EtN-P-[M α 2][G]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][X]M α 2M α 6M α 4G-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G-Y
 M α 2[M α 2][G]M α 2M α 6M α 4G-Y
 M α 2[M α 2][X]M α 2M α 6M α 4G-Y
 M α 2[M α 2][EtN-P]M α 6M α 4G-Y
 M α 6M α 4G α 6Ino-Y
 M α 2M α 6M α 4G α 6Ino-Y
 M α 2[M α 2]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][G]M α 6M α 4G α 6Ino-Y
 M α 2[M α 2][X]M α 6M α 4G α 6Ino-Y
 EtN-P-[M α 2][G]M α 2M α 6M-Y

EtN-P-[M α 2][X]M α 2M α 6M-Y
 EtN-P-[M α 2][EtN-P]M α 2M α 6M-Y
 M α 2[M α 2][G]M α 2M α 6M-Y
 M α 2[M α 2][X]M α 2M α 6M-Y
 M α 2[M α 2][EtN-P]M α 6M-Y
 M α 2M α 6M-Y
 M α 6M α 4G-Y
 EtN-P-[M α 2][G]M α 2M-Y
 EtN-P-[M α 2][X]M α 2M-Y
 EtN-P-[M α 2][EtN-P]M α 2M-Y

or derivatives or equivalents thereof wherein EtN is ethanolamine, P is phosphate, M is mannose, G is non-N-acetylated glucosamine, [G] is any non-N-acetylated hexosamine including glucosamine, or any other nitrous-acid labile substituent, Ino is inositol or inositol-phosphoglycerol, [X] is any other substituent, α represents α -linkages which may be substituted with β -linkages wherever required, numeric values represent positional linkages which may be substituted with any other positional linkages as required, and Y is any lipid or phospholipid.

38. The method according to claim 37 wherein said lipid is diacylglycerol, alkylacylglycerol, monoalkylglycerol, ceramide or sphingolipid.
39. The method according to claim 37 wherein said phospholipid is phosphatidylethanolamine, phosphatidylcholine or phosphatidylserine.
40. The method according to any one of claims 21-39 wherein said activated helper T cell provides B cell help.
41. The method according to any one of claims 21-39 wherein said activated T cells induce or otherwise upregulate a TH1 type response.

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42. The method according to any one of claims 21-39 wherein said activated T cells induce or otherwise upregulate a TH2 type response.
43. A method for the treatment and/or prophylaxis of a mammalian disease condition comprising administering to said mammal an effective amount of GPI or derivative or equivalent thereof or a complex comprising said GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with the CD1 which association activates helper T cells.
44. The method according to claim 43 wherein said helper T cell is a CD4⁺ T cell.
45. The method according to claim 44 wherein said CD4⁺ T cell is a CD4⁺ NK1.1⁺ T cell.
46. The method according to any one of claims 43-45 wherein said activated T cell provides B cell help.
47. The method according to any one of claims 43-45 wherein said activated T cells induce or otherwise upregulate a TH1 type response.
48. The method according to any one of claims 43-45 wherein said activated T cells induce or otherwise upregulate a TH2 type response.
49. A method for the treatment and/or prophylaxis of a mammalian disease condition characterised by microorganism infection, said method comprising administering to said mammal an effective amount of GPI or derivative or equivalent thereof or a complex comprising said GPI or derivative or equivalent thereof which GPI or GPI complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
50. The method according to claim 49 wherein said microorganism infection is a parasitic infection.

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51. The method according to claim 50 wherein said complex comprises GPI and malarial CS protein or derivative or equivalent thereof.
 52. The method according to claim 50 wherein said complex comprises GPI and MSP-1 or derivative or equivalent thereof.
 53. The method according to claim 50 wherein said complex comprises GPI and MSP-2 or derivative or equivalent thereof.
 54. The method according to claim 50 wherein said complex comprises *Leishmanial* PSA-2 or derivative or equivalent thereof.
 55. The method according to claim 50 wherein said complex comprises GPI and GP63 or derivative or equivalent thereof.
 56. The method according to any one of claims 49-55 wherein said GPI comprises a structure selected from:

EtN-P-[M α 2]M α 2M α 6M α 4G α 6Ino-Y

EtN-P-[M α 2][G]M α 2M α 6M α 4G α 6Ino-Y

EtN-P-[M α 2][X]M α 2M α 6M α 4G α 6Ino-Y

EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G α 6Ino-Y

EtN-P-M α 2M α 6M α 4G-Y

M α 2M α 6M α 4G-Y

EtN-P-M α 2M α 6M-Y

EtN-P-[M α 2][G]M α 2M α 6M α 4G-Y

EtN-P-[M α 2][X]M α 2M α 6M α 4G-Y

EtN-P-[M α 2][EtN-P]M α 2M α 6M α 4G-Y

M α 2[M α 2][G]M α 2M α 6M α 4G-Y

M α 2[M α 2][X]M α 2M α 6M α 4G-Y

M α 2[M α 2][EtN-P]M α 6M α 4G-Y

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$M\alpha_6M\alpha_4G\alpha_6Ino-Y$
 $M\alpha_2M\alpha_6M\alpha_4G\alpha_6Ino-Y$
 $M\alpha_2[M\alpha_2]M\alpha_6M\alpha_4G\alpha_6Ino-Y$
 $M\alpha_2[M\alpha_2][G]M\alpha_6M\alpha_4G\alpha_6Ino-Y$
 $M\alpha_2[M\alpha_2][X]M\alpha_6M\alpha_4G\alpha_6Ino-Y$
 $EtN-P-[M\alpha_2][G]M\alpha_2M\alpha_6M-Y$
 $EtN-P-[M\alpha_2][X]M\alpha_2M\alpha_6M-Y$
 $EtN-P-[M\alpha_2][EtN-P]M\alpha_2M\alpha_6M-Y$
 $M\alpha_2[M\alpha_2][G]M\alpha_2M\alpha_6M-Y$
 $M\alpha_2[M\alpha_2][X]M\alpha_2M\alpha_6M-Y$
 $M\alpha_2[M\alpha_2][EtN-P]M\alpha_6M-Y$
 $M\alpha_2M\alpha_6M-Y$
 $M\alpha_6M\alpha_4G-Y$
 $EtN-P-[M\alpha_2][G]M\alpha_2M-Y$
 $EtN-P-[M\alpha_2][X]M\alpha_2M-Y$
 $EtN-P-[M\alpha_2][EtN-P]M\alpha_2M-Y$

or derivatives or equivalents thereof wherein EtN is ethanolamine, P is phosphate, M is mannose, G is non-N-acetylated glucosamine, [G] is any non-N-acetylated hexosamine including glucosamine, or any other nitrous-acid labile substituent, Ino is inositol or inositol-phosphoglycerol, [X] is any other substituent, α represents α -linkages which may be substituted with β -linkages wherever required, numeric values represent positional linkages which may be substituted with any other positional linkages as required, and Y is any lipid or phospholipid.

57. The method according to claim 56 wherein said lipid is diacylglycerol, alkylacylglycerol, monoalkylglycerol, ceramide or sphingolipid.
58. The method according to claim 56 wherein said phospholipid is phosphatidylethanolamine, phosphatidylcholine or phosphatidylserine.

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59. The method according to claim 49 wherein said parasitic infection is a *Plasmodium* infection.
60. The method according to claim 59 wherein said *Plasmodium* is *P. falciparum*.
61. The method according to claim 49 wherein said parasitic infection is a *Leishmania* infection.
62. A method for the treatment and/or prophylaxis of a mammalian disease condition characterised by the insufficiency or absence of an appropriate TH1 response said method comprising administering to said mammal an effective amount of GPI or derivative or equivalent thereof or a complex comprising said GPI or derivative or equivalent thereof which GPI or GPI complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association induces or otherwise upregulates a TH1 response.
63. The method according to claim 62 wherein said disease condition is Leishmaniasis, a neoplastic condition or cancer.
64. A method for the treatment and/or prophylaxis of a mammalian disease condition characterised by the insufficiency or absence of an appropriate TH2 response said method comprising administering to said mammal an effective amount of GPI or derivative or equivalent thereof or a complex comprising said GPI or derivative or equivalent thereof which GPI or GPI complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association induces or otherwise upregulates a TH2 response.
65. The method according to claim 64 wherein said disease condition is cerebral malaria, type I diabetes, autoimmune arthritis or systemic lupus erythromatosis.

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66. Use of a composition comprising GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof in the manufacture of a medicament for the therapeutic and/or prophylactic treatment of a mammalian disease condition wherein said GPI or GPI complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
67. Use according to claim 66 wherein said mammalian disease condition is a microorganism infection.
68. Use according to claim 67 wherein said microorganism is *Plasmodium*.
69. Use according to claim 68 wherein said *Plasmodium* is *P. falciparum*.
70. Use according to claim 67 wherein said microorganism is *Leishmania*.
71. Use according to claim 66 wherein said disease condition is characterised by the insufficiency or absence of an appropriate TH1 response.
72. Use according to claim 71 wherein said disease condition is Leishmaniasis, a neoplastic condition or cancer.
73. Use according to claim 66 wherein said disease condition is characterised by the insufficiency or absence of an appropriate TH2 response.
74. Use according to claim 73 wherein said disease condition is cerebral malaria, type I diabetes, autoimmune arthritis or systemic lupus erythromatosis.
75. A composition capable of activating helper T cells, said composition comprising a GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.

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76. A vaccine composition comprising as the active component a GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1 which association activates helper T cells.
77. A pharmaceutical composition capable of activating helper T cells, said composition comprising a GPI or derivative or equivalent thereof or a complex comprising GPI or derivative or equivalent thereof which GPI or GPI-complex is capable of interacting with CD1 on an immune cell to form an association with CD1, which association activates helper T cells, together with one or more pharmaceutically acceptable carriers and/or diluents.
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